## On-Call Intermodal Transportation Consultant Services

**ADOT Project TPD04-04**

## Identification of Emissions Sources for Pinal County

# Revised Scope of Work and Budget

*Prepared for the*

Arizona Department of Transportation
and the
Central Arizona Association of Governments

*Prepared by*

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*October 13, 2004*

## Introduction

Portions of Pinal County have been designated as nonattainment for both $PM_{10}$ and for $SO_2$. These include a mixture of moderate and serious $PM_{10}$ nonattainment areas. A review of the available monitoring data also shows that violations of both the annual average and 24-hour average $PM_{10}$ standards have occurred at the Casa Grande, Eleven Mile Corner - Fairgrounds station in recent years. Similarly, a near violation of the eight-hour Ozone standard has been recorded at the Apache Junction, Maintenance Yard.

Discussions with Don Gabrielson of the Pinal County Air Quality Department indicate that $PM_{10}$ not Ozone is the principal pollutant of concern. He indicated that TEOMs (tapered element oscillating microbalance) measurements indicate unusually high $PM_{10}$ concentrations at several locations that are not yet reported in EPA's Aerometric Information Retrieval System (AIRS). Once EPA formally recognizes these measurements, the severity of Pinal County's nonattainment status will be increased and the County will be required to prepare plans that demonstrate how they will comply with the ambient air quality standards.

In recognition of the coming planning burden, this procurement calls for the development of a framework to assess the contributions of on-road mobile sources to reported Ozone and $PM_{10}$ concentrations in Pinal County. This requires the following:

- Collection of local travel activity data (e.g., speed, traffic counts, etc.),
- Development of an on-road emissions inventory,
- Collection of available monitoring and meteorological measurements,
- Selection of appropriate air quality models and
- Development of an evaluation and forecasting tool for assessing $PM_{10}$ air quality impacts from unpaved road travel in the central portion of Pinal County.

Since Pinal County is not currently classified as an Ozone nonattainment area (for either the 1-hour or 8-hour standards) and considerable resources are required to operate photochemical models to evaluate the significance of Ozone precursor emissions, it is proposed that the air quality modeling portion of the study evaluate the impacts of $PM_{10}$ emissions from unpaved road travel on downwind receptors. This effort will require the collection of data to characterize meteorological conditions and unpaved road activity rates and emissions in the central, agricultural portion of the County. It is further proposed that a preliminary assessment of the cost and effectiveness of unpaved road control measures be conducted, and that the costs and benefits of technologically feasible measures be incorporated into the unpaved road evaluation and forecasting tool. This tool would be developed as a spreadsheet and designed for use by the Pinal County Air Quality Control District (AQCD) in identifying public unpaved roads having the greatest air quality impacts on existing or proposed residential areas and quantifying the costs and benefits of alternative emission control measures. Analysis of Ozone will be based on estimates of Ozone precursor emissions and not on estimates of Ozone concentrations.

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The mix of skills needed to conduct this effort should include data collection, GIS development, travel demand and air quality modeling, emission inventory preparation, and control measure analysis. Experience should include relevant model design and application. Given the nature of the emissions sources in Pinal County, experience with control programs focused on fugitive dust emissions in Arizona and mobile sources in general is also needed.

To address these requirements, DKS has assembled a team of in-house professionals with support from Sierra Research, Inc., Works Consulting, Inc., and Traffic Research & Analysis, Inc. to supply the skills and experience needed to quantify local travel activity, prepare the emissions inventory, conduct the air quality modeling and begin an evaluation of suitable control measures. Sierra Research will lead the air quality modeling and analysis. Works Consulting will assist DKS with assembling traffic counts and roadway inventory data and assembling a GIS database. Traffic Research & Analysis will conduct an additional traffic data collection necessary.

DKS is a transportation planning and engineering firm with extensive experience in the use of travel models and data in emissions inventories and air quality analyses. DKS was a key participant in the recently completed Regional Transportation Plan for Maricopa County. DKS led the evaluation of alternatives and assisted with the development of travel forecasts for the alternatives. The regional model used for the MAG RTP included Pinal County. The key DKS staff proposed for this project also have significant experience with development of emissions estimates. William Loudon (Senior Project Manager), who is the proposed project manager, led the preparation of all of the travel activity data for a 30-county northern California emissions inventory as well as an emissions inventory for Ventura County. He has produced emissions estimates for long range plans for the San Francisco Bay Area; Portland, Oregon; and Atlanta, Georgia. For the Arizona DOT he developed estimates of the emission-reduction benefits of transportation projects.

Sierra Research is an air pollution consulting firm that specializes in evaluating mobile, area and point source controls and related inventory development. Sierra Research has over a decade of experience in supporting the Maricopa Association of Governments (MAG) on Ozone, CO, and $PM_{10}$ control measure analysis and related State Implementation Plan development issues. During this time, Sierra Research has also provided support to the Arizona Department of Environmental Quality (ADEQ) on mobile source related issues, particularly the development and analysis of inspection/maintenance (I/M) programs. Sierra Research provides similar types of support to wide array of federal, state and local government agencies as well as private industry and related associations. The key personnel from Sierra Reasearh will be Robert Dulla (Senior Consultant) and Earl Withycombe (Consultant).

Works Consulting has managed CAAG's transportation data collection and state submittals for the past four years. They have an excellent relationship with CAAG and all of CAAG's participating agencies. Works Consulting is also beginning work soon on a GIS definition of the Pinal County roadway network. The firm has also generated

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HPMS data submittals to FHWA for ADOT since 1996. This includes the statewide VMT, traffic and roadway inventory for all public roads statewide. Works Consulting has co-written the Regional Traffic Counting Policy for Arizona's rural areas and will be updating the traffic count program for Pinal County later in the year. Works Consulting is on ADOT's Intermodal Transportation Consultant Services list for data collection. The key individual from Works Consulting will be Joe Breyer (Consultant).

Since 1997, Traffic Research & Analysis (TRA) has been providing data collection services to the Arizona Department of Transportation's Transportation Planning Group and to most of the transportation agencies in the Greater Phoenix area. TRA provides a variety of data collection services that may be required for this project including traffic counts, vehicle classification counts, speed studies and roadway inventories. TRA is also on ADOT's Intermodal Transportation Consultant Services list for data collection.

## Scope of Work

### Task 1 Define Geographical Scope and Analysis Parameters

The DKS Team will meet with ADOT, and a Technical Advisory Committee that will include CAAG, the Pinal County Public Works Department and the Pinal County Air Quality Control District to discuss and define the project needs and the plan defined in the DKS Team proposal. Adjustments to the proposed plan will be made as necessary to reflect the priorities of the participating agencies. Additional one-on-one meetings will be held with each of the agencies to discuss data availability and analysis methods and models available. Specific parameter issues to be addressed in meetings will be analysis years, geographic boundaries of the analysis, monitoring sites to be evaluated and GIS software to be used for data management.

### Task 2 Assemble and Collect Data

Existing data will be assembled and new data collected to allow the DKS Team to identify the sources that contribute to elevated $PM_{10}$ and Ozone monitor readings and to forecast the potential impact on monitor readings of future vehicle emissions from growth in travel. The data assembled or collected will be used to support methods or models that can be used by the DKS Team and Pinal County to assess why certain monitors in the county are recording elevated readings. These same methods or models will be used to provide rough estimates of how population growth in the county and growth in travel will affect pollutant emissions and concentrations in the future and to analyze the potential benefits from possible control measures. Methods or models will be needed to provide estimates of vehicular travel (existing and for future years), pollutant emissions from vehicles and changes in concentration levels of pollutants near selected monitors.

The DKS Team will use existing traffic counts supplemented with new counts at selected locations near monitors to develop an estimate of current traffic volumes and travel activity. The DKS Team will draw from traffic count data maintained by the cities and

by Pinal County as well as data in the ADOT HPMS database. Estimates of total daily vehicle trips and vehicle miles travel for use in the estimation of Ozone precursors will be developed by using population and employment estimates for the county and the individual cities in the county and appropriate suburban and rural household travel rates (trips per household and VMT per trip) supplied by MAG. Forecasts of traffic volumes and of travel activity will be produced based on the population and employment forecasts for Pinal County and the limited travel modeling of Pinal County done with the MAG travel model for the Southeast Maricopa – Northern Pinal County Area Transportation Study. These sources will provide a reasonable estimate of values for future years for the travel characteristics needed for prediction of Ozone precursors.

Data on $PM_{10}$ and Ozone concentrations will be obtained by assembling all recent monitoring reports. Meteorological data will also be obtained to allow dispersion modeling of $PM_{10}$ emissions from unpaved roads. Emission rates from unpaved roads will be estimated from the site-specific data using EPA-approved emission factors. Production of Ozone precursor emissions will be estimated from mobile sources using EPA's MOBILE6 model. The DKS Team will draw on recent application of the model by MAG for the RTP conformity analysis for local input values.

**Subtask 2.1    Assemble or Collect Demographic and Travel Data**

The DKS Team will assemble data relevant for the analysis of existing travel patterns and for forecasting future travel volumes. All data assembled by the team will be stored in a GIS compatible database format compliant with ADOT's Arizona Transportation Information System. This will allow for easy access to all data, use of the data with geographic and linear references, and allowing for evolution toward more sophisticated GIS and travel model development for CAAG and the County for the future. The DKS Team will assemble available data from ADOT, CAAG, Pinal County, the cities in the county, and neighboring MAG and PAG agencies. This will include the following:

- Demographic and Employment Data – Data are available from the Southeast Maricopa – Northern Pinal County Area Transportation Study and the Center for Economic Research at the Central Arizona College

- Roadway Networks – Roadway network data are available from CAAG through their recent HPMS and Functional Reclassification efforts. Supplemental roadway network information can be gleaned from recent orthophotos that include nearly all of the County thanks to the efforts of Pinal County

- Traffic Counts - Counts are available from ADOT, CAAG, Pinal County and the cities of Apache Junction, Florence, and Casa Grande. Works Consulting regularly works with the traffic count database for ADOT and Maricopa County. They also catalog the traffic count results for CAAG and its member agencies.

- Estimated Traffic Volumes – Estimates of current and future traffic volumes are available from the Southeast Maricopa – Northern Pinal County Area Transportation Study. Other parts of the county are covered by recent small area transportation studies (SATS) or the Pinal County Transportation Plan 2000 Update.

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- Vehicle Miles of Travel – Annualized VMT estimates are available from the ADOT HPMS system. Shorter term VMT estimates can be estimated by using ADOT's automatic traffic recorder data.

- Vehicle Speeds – Data are available on speed limits from the HURF and HPMS databases and from recent work done for the traffic safety inventory and functional re-classification of roads in the county.

- Miles of Paved Roads – Pinal County maintains an inventory of paved roadways under their maintenance jurisdiction in their annual HURF report. CAAG reports certified public mileage inventory (by owner) through HPMS. An upcoming CAAG effort to review Pinal County aerial photography will be conclusive in differentiating between paved and unpaved publicly owned or maintained mileage.

- Miles of Unpaved Roads - Pinal County maintains an inventory of unpaved roadways in their annual HURF report. CAAG reports certified public mileage inventory (by owner) through HPMS. An upcoming CAAG effort to review Pinal County aerial photography will be conclusive in differentiating between paved and unpaved publicly owned or maintained mileage.

The DKS Team will coordinate with Pinal County and CAAG to make sure that all data are stored in a compatible and desirable GIS format. The County is planning to develop a GIS system for transportation data which meets their own needs as well as regional CAAG needs. Works Consulting is developing and maintaining the HPMS database submittals for CAAG and ADOT. The DKS Team will coordinate with the County and CAAG to ensure maximum compatibility with both.

**Subtask 2.2.   Assemble or Collect Unpaved Road Modeling Information**

Sierra will assess air quality impacts from unpaved road travel in Pinal County using emissions estimating and pollutant dispersion models populated with local source and meteorological data. Emission analysis will be performed using models published in AP-42 or developed by EPA contractors working the field of fugitive dust research. $PM_{10}$ dispersion modeling will be conducted using the EPA-approved ISCST3 model with options configured to support the analysis of fugitive dust emissions.

Fugitive $PM_{10}$ emissions from unpaved road travel are dependent on several factors that are site-specific. In the AP-42 equation, these factors include the fraction of silt material (dust passing through a 200 mesh screen) within the layer of loose soil on the road surface, the moisture content of the road surface soil, the weight of the vehicle traveling the unpaved road, and the speed of the vehicle. Under this subtask, typical values of these parameters will be determined through local data collection.

Agricultural soil maps and data developed by the U.S. Department of Agriculture will be used to determine the number of significant soil types in the central portion of Pinal County under agricultural cultivation. Five major or distinct soil types spanning the range of local silt contents will be identified and the spatial coverage of these soil types

will be determined. Unpaved roads with typical traffic levels in each soil region will be identified through collaboration with the Pinal County AQCD and the Pinal County Department of Public Works. Surface soil samples will be collected by Traffic Research & Analysis on at least one road in each of the five soil regions and analyzed for silt fraction, moisture content, and fine particle size distribution. Sample analysis will be performed by Construction Inspection and Testing, Inc. Sample collection and analysis will conform to the specifications of AP-42[1], Appendix C.

Traffic counts will be obtained on the roads from which surface soil samples will be collected. A total of five unpaved road segments, one in each of the five major or distinct soil regions, will be sampled. Each count will be of seven-day duration, and will be conducted with equipment that will provide vehicle count, weight, and speed data. If possible, some counts will be conducted on roads experiencing elevated truck traffic during the harvesting of nearby crops, while others will be conducted outside of the harvest season to determine typical non-harvest unpaved road travel patterns.

Meteorological data recorded in Pinal County by the AQCD and others will be collected and evaluated for completeness and adequacy with respect to use in dispersion modeling of unpaved road emissions. At a minimum, meteorological datasets must contain at least one year of hourly data on wind speed, wind direction, atmospheric stability, and temperature. Pinal County AQCD has collected meteorological data at three sites in the area of study that may satisfy completeness requirements. Maps of soil regions and meteorological monitoring sites will be used to select the most representative meteorological database for the dispersion modeling of unpaved roads within each soil region.

## Task 3 Prepare and Analyze Emission Estimates

The DKS Team will prepare emission estimates for Ozone precursors and for $PM_{10}$ for a recent year for which monitor readings are available. For $PM_{10}$, the DKS Team will also prepare microscale dispersion model to produce estimates of $PM_{10}$concentrations at the monitoring sites. Emission estimates for Ozone precursors and concentration levels for $PM_{10}$ will be developed in sufficient level of detail to help explain why reading values at certain monitoring sites have been elevated in recent years. These planning level estimates will also help the team to determine whether future growth in population, employment and travel in Pinal and adjacent counties is likely to lead to elevated readings in the future. Finally, the estimates in this task will help the team to identify where emission control measures might be warranted and which control measures might be most appropriate.

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[1] Compilation of Air Pollutant Emission Factors, AP-42, U.S. Environmental Protection Agency, January 1995

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**Subtask 3.1 Estimate On-road Ozone Precursors**

The DKS Team will use data assembled or collected in Task 2 to supplement modeling work done for northern Pinal County by MAG. This will form the basis for estimating the Ozone precursors (ROG and NOx) using the EPA model MOBILE6. The MAG model system has 88 zones in Pinal County and includes all of the freeways and state highways in the transportation network. DKS will use the model data to form the basis for estimating total vehicle trips and VMT by time of day for the existing and forecasted future households and employment in the county. Where necessary, the model data will be supplemented with additional trip and VMT estimates generated using aggregate trip and VMT rates derived from MAG models for areas of Maricopa County with similar characteristics.

**Subtask 3.2 Evaluate Trends in Ozone Precursors**

The DKS Team will examine the predicted trends in Ozone precursors for Pinal County using estimates for 1990, 2000 and 2025. The trends will be used to determine whether Pinal County is likely to experience violations of the Ozone standard in the future. The rates of growth in county population and employment will also be compared with expected reduction in the emission rates for Ozone precursors to determine whether growth in travel is likely to exceed the rate of reduction of emissions per vehicle mile traveled. Forecast of emissions by MAG as part of the recent RTP conformity analysis will also be examined to determine whether the transport of pollutants from Maricopa County to Pinal County is likely to produce elevated levels of Ozone concentrations at Pinal county monitoring sites.

**Subtask 3.3. Estimate Unpaved Road Emission Rates**

The data collected from unpaved road traffic counts and surface soil sampling will be used to develop emission factor equations for use in populating a matrix of emissions estimates in a spreadsheet tool for use by Pinal County AQCD in estimating $PM_{10}$ impacts from unpaved road travel on downwind receptors in the agricultural district in central Pinal County. Surface soil characteristics will be used to develop constants for use in the EPA emission factor equation for unpaved road travel. These characteristics include the silt and moisture contents of the surface soil. Averages of these values within each major soil type area will be developed to produce zone-specific equations within the Pinal County study area.

The traffic count data will be used to develop vehicle weight profiles, speed ranges, and activity levels for unpaved road travel. The first two parameters are variables in the EPA emission factor equation, and the collection of these data will complete the process for developing soil region-specific versions of the equation for Pinal County. The vehicle count data will be used to determine variations between weekday and weekend travel, diurnal (hour to hour) variations, and (if possible) the added contributions of harvest season travel, when heavy duty truck fractions will peak.

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## Subtask 3.4  Model Unpaved Road Emission Impacts

Sierra Research will perform dispersion modeling to determine the air quality impacts of unpaved road travel emissions at varying downwind distances.  Unit emission rates will be used to represent fugitive dust emissions from hypothetical road links oriented both north-south and east-west.  Using meteorological data most representative of dispersion conditions within each of the major soil areas, downwind $PM_{10}$ concentrations will be modeled over a range of separation distances representative of the proximities of residences to unpaved roads in the central portion of Pinal County under agricultural cultivation.  The modeling will be performed using the U.S. Environmental Protection Agency (EPA) Industrial Source Complex-Short Term (ISCST3) emission dispersion model.   Data on particle size distributions produced by laboratory analysis of the collected road surface soil samples will be used to configure the deposition algorithm in ISCST3 to account for the settling and deposition of larger dust particles near to and downwind of unpaved roads.  The resulting data linking maximum 24-hour and annual concentrations with downwind separation distance will be statistically processed to develop curve-fitting equations representative of each major soil region.  The curve-fitting equations will be combined with unpaved road travel emission factor equations to produce a spreadsheet tool designed to estimate downwind $PM_{10}$ impacts as a function of vehicle count, vehicle weight distribution, roadway orientation, and downwind separation distance for each major soil area in the study area.

## Subtask 3.5  Analyze $PM_{10}$ Control Measures

Control measures applicable to reduction of $PM_{10}$ emissions from unpaved road travel will be evaluated by Sierra for technical and economic feasibility in Pinal County. Candidate control measures will be identified through a review of studies conducted by Sierra Research in serious $PM_{10}$ nonattainment areas in the Pacific Southwest.[2,3,4]   Other sources of data on fugitive dust control measure feasibility and cost, including studies conducted for EPA and the South Coast Air Quality Management District, will be reviewed.  The control efficiencies of the control measures deemed to be technologically feasible will be added to the $PM_{10}$ impact spreadsheet to enable Pinal County AQCD to assess the reductions in air quality impacts resulting from application of specific controls to any unpaved road being evaluated.  At the conclusion of spreadsheet development, a user's manual will be drafted to assist Pinal County AQCD in the use of the spreadsheet tool.

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[2] Particulate Control Measure Feasibility Study, prepared for Maricopa Association of Governments by Sierra Research, January 1997
[3] Most Stringent $PM_{10}$ Control Measure Analysis, prepared for Maricopa Association of Governments by Sierra Research, May 1998
[4] BACM Technological and Economic Feasibility Analysis, prepared for the San Joaquin Valley Unified Air Pollution Control District by Sierra Research, January 2003

## Task 4 Prepare Project Reports

The DKS Team will provide thorough documentation of all work completed and progress achieved in the project. Our documentation will take the form of quarterly progress reports, task-specific analysis memoranda, and a final report. These three forms of reporting will be used to ensure that there is adequate communication with ADOT and the members of the Technical Advisory Committee. All methods used and data assembled or collected will be described and submitted for review to allow the TAC to comment or suggest modification of the approach. The documentation will also facilitate future use of the data or methods used in the project.

### Subtask 4.1 Prepare Quarterly Progress Reports

DKS will prepare quarterly (calendar year) progress reports at the end of each quarter. At a minimum, the reports will cover the tasks completed, the tasks underway, the percent of tasks completed, problems encountered and strategies selected to resolve them, and tasks to be completed in the next period

### Subtask 4.2 Prepare Task-Specific Analysis Memoranda

The DKS Team will prepare a technical memorandum for each of the first three tasks clearly documenting the results of the task work. This will include documentation of the data assembled and collected as well as documentation of all models used for emission and concentration estimates and documentation of the results produced for the project

### Subtask 4.3 Prepare Final Report

The DKS Team will use the technical memoranda from the first three tasks to develop a final report for the project. The report will documentation of data assembled or collected, models used, model results, findings and recommendations for further research. The report will also include recommendations for options to address potential problem areas to ensure that Pinal County will comply with the Clean Air Act's National Ambient Air quality Standards for Ozone and $PM_{10}$. A draft will be prepared for review by the TAC. The DKS Team will then prepare a final version with appropriate responses to the TAC's comments.

## Task 5 Prepare $PM_{10}$ Attainment Plan Blueprint

At the option of ADOT, the DKS Team will prepare a blueprint for the development of a $PM_{10}$ attainment plan for central Pinal County. This work has been given the highest priority by Pinal County AQCD in anticipation of a forthcoming $PM_{10}$ nonattainment designation by EPA. The ambient air quality data collected by the County AQCD indicate that exceedances of national 24-hour and annual ambient air quality standards for $PM_{10}$ are frequent and persistent. As a result, AQCD officials expect that the central portion of Pinal County will be designated as a $PM_{10}$ nonattainment area by EPA in the near future. When a nonattainment designation is declared, Pinal County will have 18

months to develop and submit to EPA a plan for attaining both $PM_{10}$ standards. Failure to submit a plan within the allowed timeframe will result in sanctions being imposed on Pinal County. For this reason, Pinal County is desirous of researching and designing a blueprint now for the development of the attainment plan instead of compressing this initial investigation work into the statutory timeframe for plan development. Key goals of a successful planning effort are the approval by the Pinal County Board of Supervisors of the planning process, the approval by EPA of the completed plan, and approval by the regulated community in Pinal County of both the plan and the implementing emission control measures.

### Subtask 5.1  Evaluate Pinal County $PM_{10}$ Violations

Sierra Research will review and evaluate Pinal County PM monitoring data, limited supplemental PM studies, and local meteorological data to characterize the conditions that resulted in violations of 24-hour and annual $PM_{10}$ ambient air quality standards in 2003 and 2004. $PM_{10}$, $PM_{2.5}$, and meteorological data collected in Maricopa and Pima Counties will be analyzed to gain information on the transport of coarse and fine fraction $PM_{10}$ from these areas into Pinal County. These data will be used to assess the relative contributions of directly emitted $PM_{10}$ and secondary aerosol, high wind events, and localized source emissions to violation events in Pinal County. The information gained from this analysis will be used to focus the subsequent task work relative to emission inventories and modeling on aspects critical to Pinal County's $PM_{10}$ problems. A memo report would be drafted at the conclusion of this analysis summarizing the investigations and findings.

### Subtask 5.2  Evaluate Other Serious $PM_{10}$ Nonattainment Planning Processes

Under this task, Sierra will review the planning processes used to develop attainment plans in other serious $PM_{10}$ nonattainment areas and the progress made toward attainment since plan implementation. The serious $PM_{10}$ planning processes that will be studied include those of Maricopa County/Arizona, Clark County/Nevada, San Joaquin Valley/California, and Coachella Valley/California. For each of these areas, $PM_{10}$ attainment plans and supporting documents will be reviewed to gain an overview of the air quality research, emission inventory compilation, and air quality modeling approaches used to characterize the $PM_{10}$ problems and solutions that are relevant to Pinal County's $PM_{10}$ violations. Monitoring data will be reviewed to determine any trends in $PM_{10}$ levels subsequent to implementation of attainment plans. Air quality planning staff at the agencies that prepared attainment plans and at EPA Region IX who evaluated and approved the plans will be interviewed by telephone to determine the strengths and weaknesses of the technical approaches in support of attainment planning. Information on the progress toward attainment of air quality standard will be gathered and analyzed to provide information on the successes or failures of the inventory and modeling approaches used in these areas. A memo report would be drafted at the conclusion of this research summarizing the investigations and findings.

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## Subtask 4.3  Research Current Research and Planning Tools

The array of regional air quality models continues to grow as air quality planning agencies undertake research to understand the sources and dynamics of visible haze and $PM_{2.5}$ problems.  Although the regional models being applied to this effort are intended to cover domains larger than the agricultural portion of Pinal County and to be supported by meteorolological databases more extensive and robust than any compiled to date in the County, one or more of these sophisticated tools may hold promise in being able to forecast $PM_{10}$ concentrations in a cost-effective manner and serve as the foundation for Pinal County air quality planning efforts.  Models that would be evaluated under this task for benefit to Pinal County air quality planning include the Sparse Matrix Operator Kernal Emissions (SMOKE) emission inventory database system, the Community Multiscale Air Quality (CMAQ) regional dispersion model, and the Regional Modeling Systems for Aerosols and Deposition (REMSAD), among others.  A literature search will be conducted to evaluate the utility of these new air quality planning tools for use in Pinal County, and case studies of air quality planning using these tools will be reviewed.

In a separate analysis, the utility of using a Geographic Information System (GIS) platform to construct emission density data will be assessed as a screening tool for assessing $PM_{10}$ hotspots and the benefits of emission control measures.  Under this task, Sierra would review the GIS capabilities in place in Pinal County and the potential for adding layers that would include emissions estimates.  Research would be conducted to identify software add-ons that could be configured to compute maximum daily and annual $PM_{10}$ emissions on the basis of land use codes and activity rates supplied as separate databases.  A memo report would be drafted at the conclusion of these two analyses summarizing the investigations and findings.

## Subtask 5.4  Evaluate Emission Inventory Requirements

For each regional air quality model deemed feasible for use in forecasting Pinal County $PM_{10}$ impacts, the emission inventory system required for support would be evaluated. The emission data requirements for each air quality model would be identified, and the availability of existing public and private databases to fulfill these requirements would be investigated.  Database repositories would be contacted to assess the completeness, accuracy, and utility of existing databases to satisfy model requirements.  Data gaps would be identified, and approaches for collecting the data would be evaluated.  The frequency with which databases would have to be updated to provide credible data for modeling purposes would be evaluated, and costs for the acquisition of commercial data would be identified.

To assure that appropriate emission factors would be included in any emission inventory system, Sierra will evaluate and identify any data gaps with respect to locally-specific emission factors for affected source categories.  Where data gaps are identified, an outline of the research needed to resolve these gaps will be presented.  A memo report would be drafted at the conclusion of this analysis summarizing the investigations and findings.

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**Subtask 5.5 Recommend A Blueprint For PM$_{10}$ Attainment Plan Development**

Based on the information collected and evaluated in prior tasks, Sierra will provide recommendations to Pinal County AQCD on the steps needed to develop a successful PM$_{10}$ attainment plan. Key goals of a successful planning effort are the approval by the Pinal County Board of Supervisors of the planning process, the approval by EPA of the completed plan, and approval by the regulated community in Pinal County of both the plan and the implementing control measures. Critical to achieving these goals is the development of technical documentation supporting the need to control specific sources, the pursuit of a process to identify effective and affordable control measures, and implementation of an effective communication program designed to engage the regulated community and incorporate their ideas. These principles will guide the recommendations developed by Sierra in a PM$_{10}$ attainment planning process blueprint. At the conclusion of this task, a report covering each investigation and analysis performed under this task would be drafted.

The crafting of a blueprint for development of a Pinal County PM$_{10}$ attainment plan includes tasks that could benefit from much more research than is contemplated in Task 5 above. Because the state-of-the-art of modeling fugitive dust emissions, which preliminary evidence suggests is the overwhelming source of PM$_{10}$ exceedances in Pinal County, on a regional basis is in its infancy, the research proposed to be conducted in Task 5 may raise more questions than it answers. If this is the outcome, these results will be reported and the information gaps for which additional research is needed will be identified. This result may not be satisfactory to Pinal County, especially if some of these information gaps could be resolved through an extension of work under this contract. If this finding arises, a request for supplemental work targeted at expanding research on fugitive PM$_{10}$ emission inventory and regional dispersion modeling tools may be forthcoming from Pinal County. An estimate of cost for this work would depend on the findings made when completing the work under Task 5.

**Subtask 5.6 Prepare Progress Reports for Blueprint For PM$_{10}$ Attainment Plan Development**

In this subtask, DKS and Sierra Research will prepare additional progress reports to cover the work in Task 5.

## Project Schedule

DKS proposes to complete all of the work in Tasks 1 through 3 within one year. Task 1 will be completed within two month of a notice to proceed. Task 2 will be completed by the end of month six. Task 3 will be completed by the end of month 10 and the final report and all other reporting will be completed by the end of month 12, if Task 5 is not pursued. If Task 5 is approved for funding, this task will be completed at the end of month 16 and the final report and all other reporting will be completed by the end of month 18. Meetings with the Technical Advisory Committee are anticipated at the beginning of the project, at the end of month 5 to discuss progress and results from Task 2, at the end of month 8 to discuss progress and results form Task 3 and at the end of month 11 or 17 to discuss the draft report and the project results.

## Project Budget

With the revisions in the scope of work, the overall budget for Tasks 1 through 4 has changed only slightly. The new estimate for these tasks is $99,659. The details of the budget estimate are provided in Tables 1 and 2. The cost for Task 3 was reduced somewhat, but more budget was required in Task 1 to revise the scope and to prepare the scope for the optional Task 5: "Prepare $PM_{10}$ Attainment Plan Blueprint." The budget estimate for Task 5 is shown in Tables 3 and 4. The total is $41,018. The combined budget for all of the work, Task 1 through 5, would be $140,677.

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# DKS Associates
## TRANSPORTATION SOLUTIONS

**TABLE 1**
**Revised Staff Hours by Task**

| *DKS Associates* | | Staff | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Task | Task Description | Sr. Project Mgr. | Sr. Consultant | Consultant | Sr. Planner | Planner | Admin Support | Technician | Graphics /CADD | TOTAL |
| **Task 1** | **Define Scope and Analysis Parameters** | **32** | **7** | **63** | **0** | **0** | **4** | **0** | **0** | **106** |
| 1.1 | **Meet with Paricpating Agencies** | 24 | | 8 | | | 2 | | | 34 |
| 1.2 | **Revise Scope, Budget and Schedule** | 8 | 7 | 55 | | | 2 | | | 72 |
| | | | | | | | | | | |
| **Task 2** | **Assemble and Collect Data** | **44** | **2** | **42** | **0** | **52** | **6** | **16** | **0** | **162** |
| 2.1 | **Assemble or Collect Demographic and Travel Data** | 40 | | 20 | | 40 | 6 | 16 | | 122 |
| 2.2 | **Assemble or Collect Unpaved Road Data** | 4 | 2 | 22 | | 12 | | | | 40 |
| | | | | | | | | | | |
| **Task 3** | **Prepare and Analyze Emission Estimates** | **46** | **6** | **94** | **24** | **36** | **0** | **0** | **0** | **206** |
| 3.1 | **Estimate On-road Ozone Precursors** | 16 | | | 24 | | | | | 40 |
| 3.2 | **Evaluate Trends in Ozone Precursors** | 24 | | | | 16 | | | | 40 |
| 3.3 | **Estimate Unpaved Road Emission Rates** | 2 | | 20 | | | | | | 22 |
| 3.4 | **Model Unpaved Road Emission Impacts** | 2 | 2 | 22 | | 20 | | | | 46 |
| 3.5 | **Analyze PM10 Control Measures** | 2 | 4 | 52 | | | | | | 58 |
| | | | | | | | | | | |
| **Task 4** | **Prepare Project Reports** | **96** | **8** | **48** | **24** | **8** | **16** | **0** | **6** | **206** |
| 4.1 | **Prepare Monthly Status Reports** | 12 | 2 | 6 | | | | | | 20 |
| 4.2 | **Prepare Task-Specific Analysis Memoranda** | 44 | 2 | 18 | 24 | 8 | 16 | | | 112 |
| 4.3 | **Prepare Final Report** | 40 | 4 | 24 | | | | | 6 | 74 |
| | | | | | | | | | | 0 |
| **TOTAL** | | **218** | **23** | **247** | **48** | **96** | **26** | **16** | **6** | **680** |

# DKS Associates
TRANSPORTATION SOLUTIONS

**TABLE 3**
**Optional Task 5 Staff Hours by Task**

| *DKS Associates* | | | | | Staff | |
|---|---|---|---|---|---|---|
| Task | Task Description | Sr. Project Mgr. | Sr. Consultant | Consultant | Planner | TOTAL |
| Task 5 | **Prepare PM10 Attainment Plan Blueprint** | | | | | |
| | **5.1 Evaluate Pinal County PM10 Violations** | 2 | 2 | 36 | | 40 |
| | **5.2 Evaluate Other Serious PM10 Nonattainment** | | | | | 86 |
| | **Planning Processes** | 2 | 4 | 80 | | |
| | **5.3 Research Current Research and Planning Tools** | | | | | 80 |
| | | 2 | 4 | 58 | 16 | |
| | **5.4 Evalute Emission Inventory Requirements** | 2 | 4 | 56 | | 62 |
| | **5.5 Recommend a Blueprint for PM10 Attainment** | | | | | 22 |
| | **Plan Development** | 2 | | 20 | | |
| | **5.6 Prepare Project Progress Reports** | 4 | | | | |
| | | | | | | 0 |
| **TOTAL** | | **14** | **14** | **250** | **16** | **290** |